2.6 — Long Run Industry Equilibrium

ECON 306 • Microeconomic Analysis • Spring 2022

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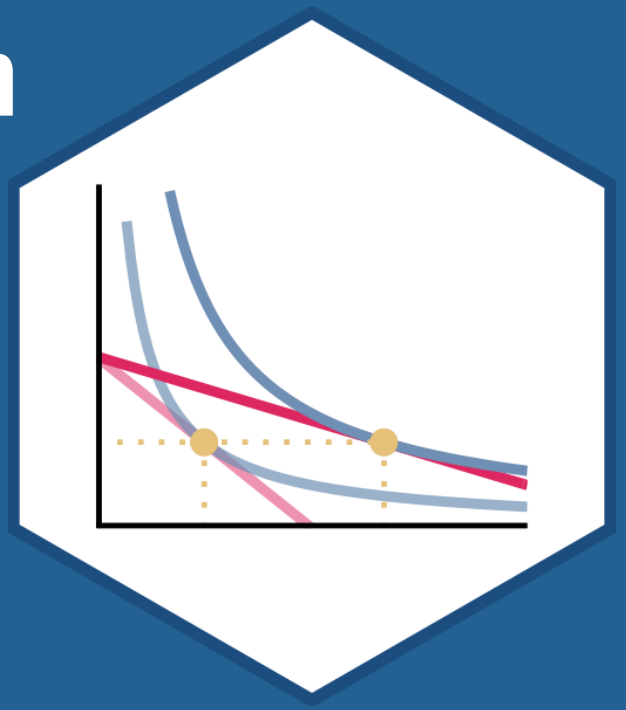
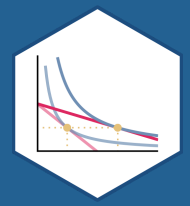
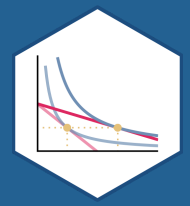


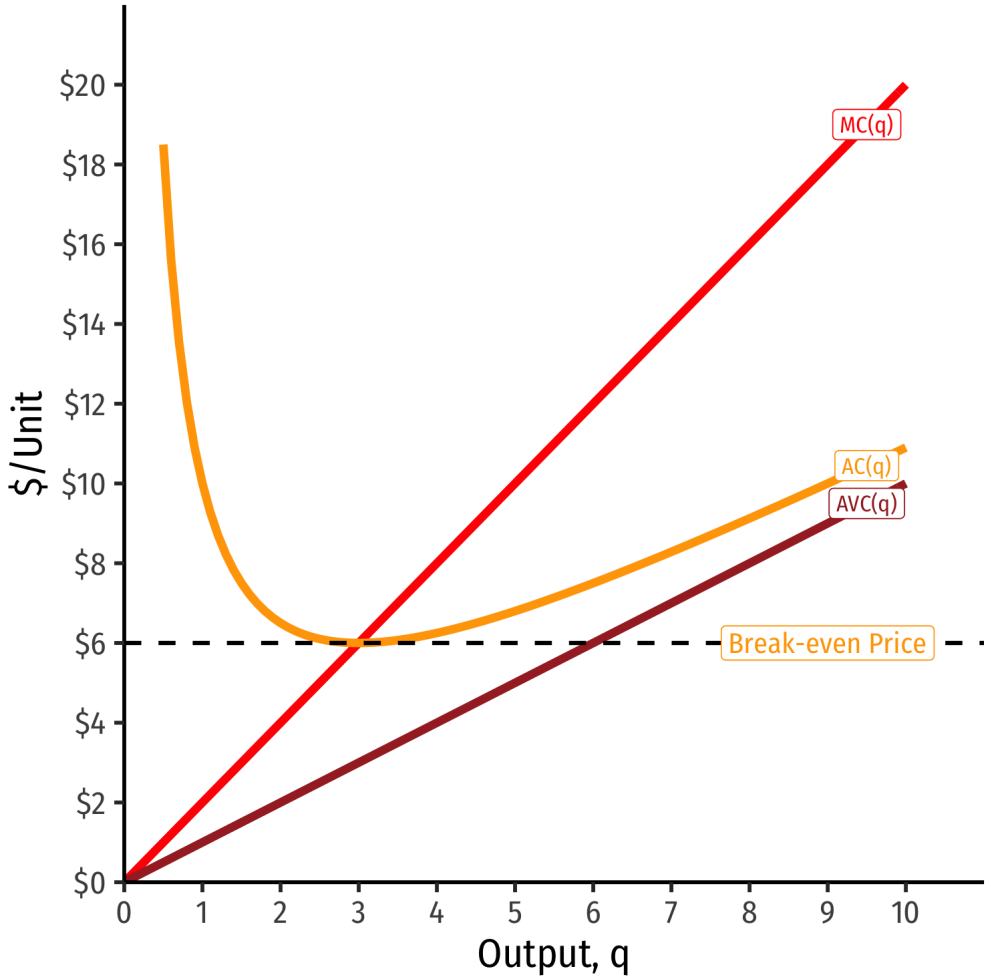
Outline





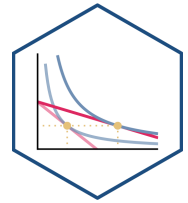
Firm's *Long Run* Supply Decisions

Firm Decisions in the Long Run I



- $AC(q)_{min}$ at a market price of $6
  - Firm earns **"normal" economic profits**
- At any market price **below** $6.00, firm earns **losses**
  - Short Run: firm shuts down if $p < AVC(q)$
- At any market price **above** $6.00, firm earns **"supernormal" profits** (>0)

Firm Supply Decisions in the Short Run vs. Long Run

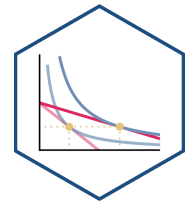


- **Short run**: firms that shut down ($q^* = 0$) stuck in market, incur fixed costs $\pi = -f$

Firm Supply Decisions in the Short Run vs. Long Run

- **Short run**: firms that shut down $(q^* = 0)$ stuck in market, incur fixed costs $\pi = -f$
- **Long run**: firms earning losses $(\pi < 0)$ can **exit** the market and earn $\pi = 0$
    - No more fixed costs, firms can sell/abandon f at $q^* = 0$

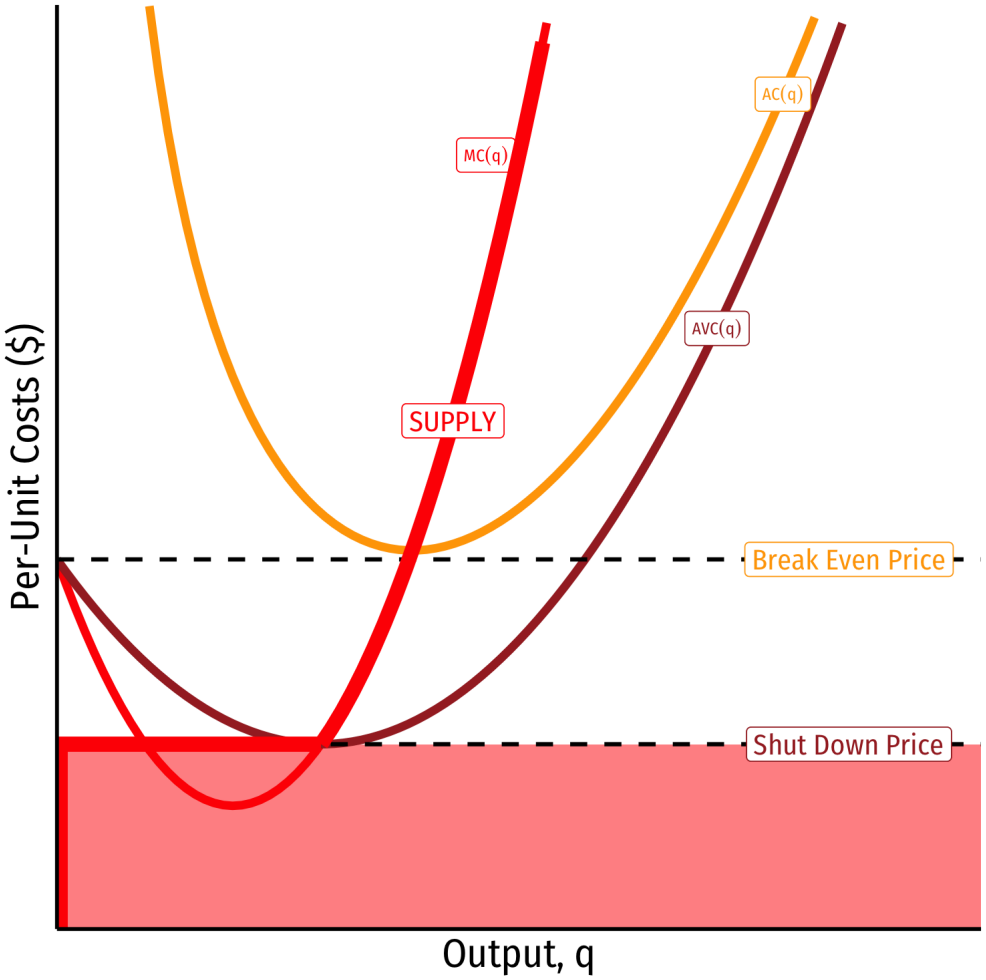
Firm Supply Decisions in the Short Run vs. Long Run



- **Short run**: firms that shut down $(q^* = 0)$ stuck in market, incur fixed costs $\pi = -f$
- **Long run**: firms earning losses $(\pi < 0)$ can **exit** the market and earn $\pi = 0$
    - No more fixed costs, firms can sell/abandon f at $q^* = 0$
- Entrepreneurs not *currently* in market can **enter** and produce, if entry would earn them $\pi > 0$

Firm Supply Decisions in the Short Run vs. Long Run

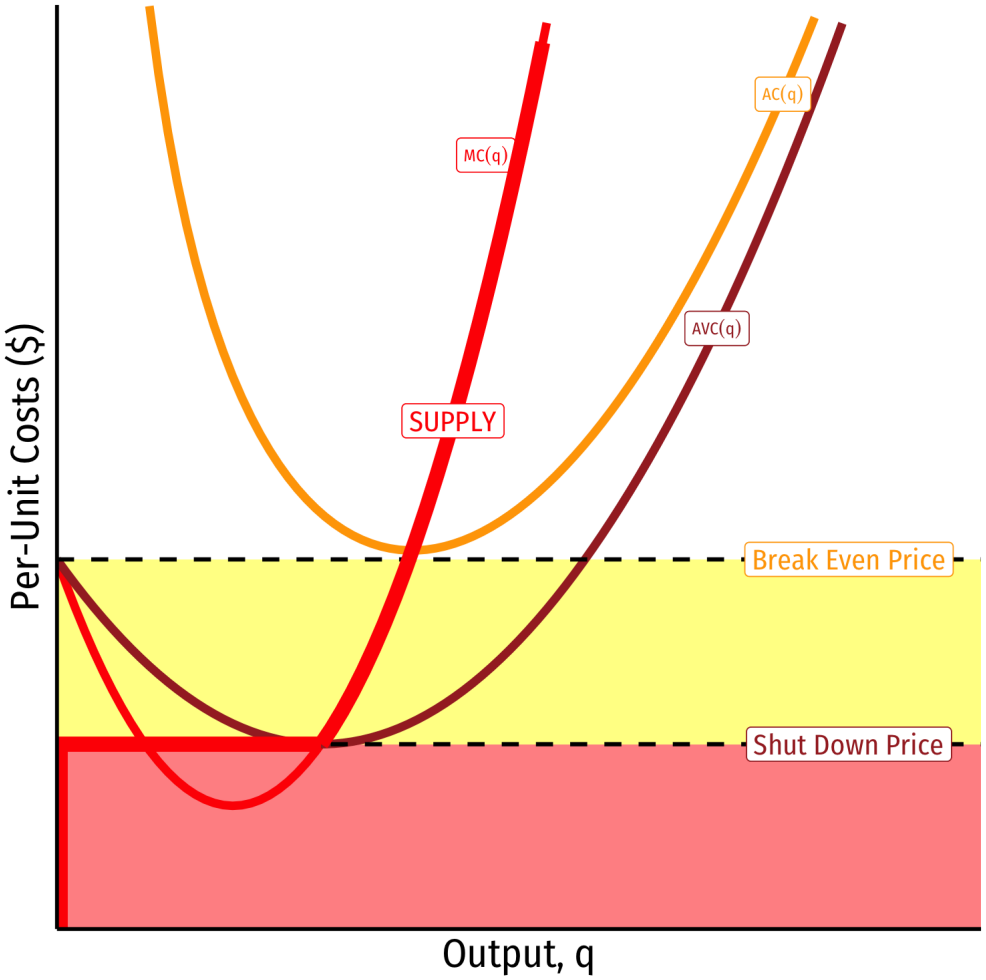
Firm's Long Run Supply: Visualizing



When $p < AVC$

- Profits are *negative*
- **Short run**: **shut down** production
  - Firm loses more π by producing than by not producing
- **Long run**: firms in industry **exit** the industry
  - *No* new firms will *enter* this industry

Firm's Long Run Supply: Visualizing



When $AVC < p < AC$

- Profits are *negative*
- **Short run**: **continue** production
  - Firm loses *less* π by producing than by *not* producing
- **Long run**: firms in industry **exit** the industry
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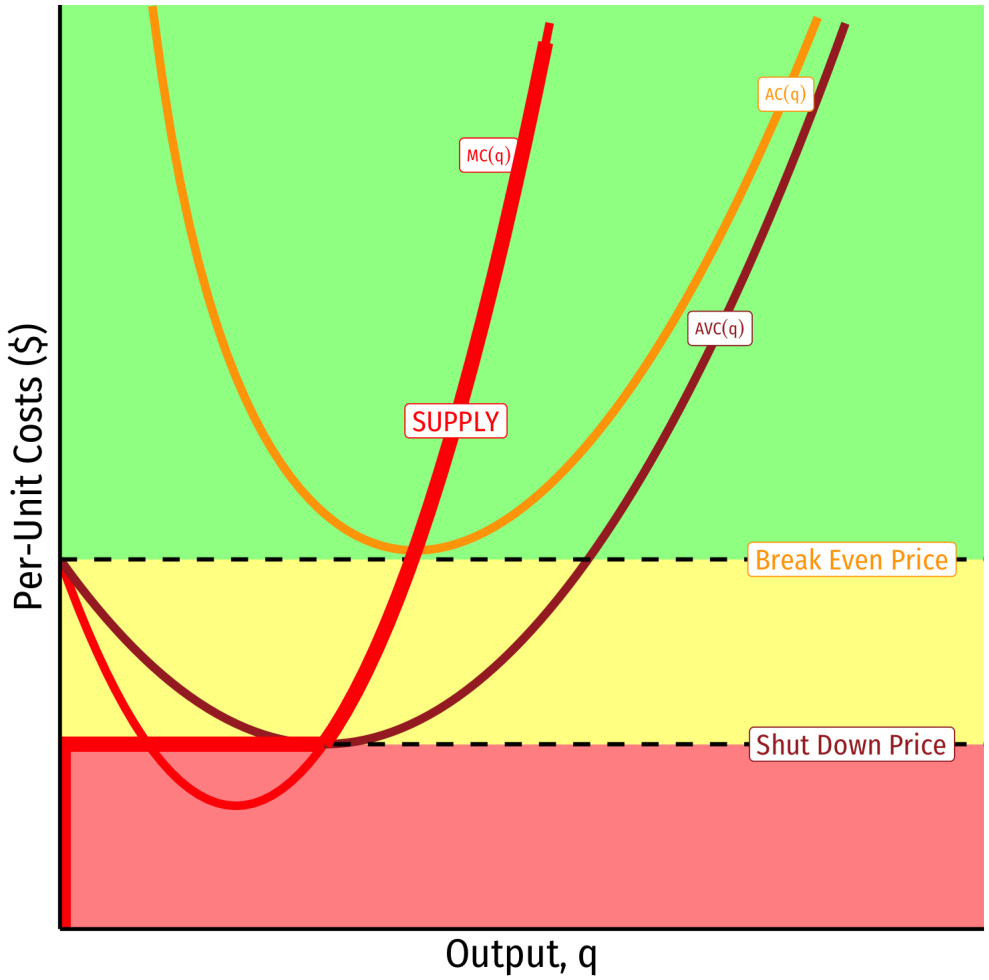
Firm's Long Run Supply: Visualizing



When $AC < p$

- Profits are *positive*
- **Short run**: **continue** production
  - Firm earning profits
- **Long run**: firms in industry **stay** in industry
  - **New** firms will **enter** this industry

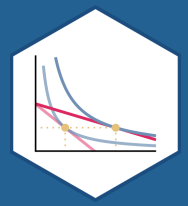
Production Rules, Updated:

1. Choose q^* such that $MR(q) = MC(q)$

2. Profit $\pi = q[p - AC(q)]$

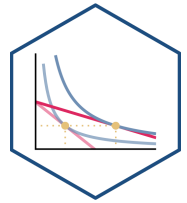
3. Shut down in *short run* if $p < AVC(q)$

4. Exit in *long run* if $p < AC(q)$



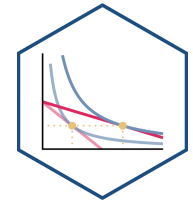
Market Entry and Exit

Exit, Entry, and Long Run Industry Equilibrium I



- Now we must combine **optimizing** *individual* firms with *market-wide* adjustment to **equilibrium**
- Since $\pi = [p - AC(q)]q$, in the **long run**, profit-seeking firms will:

Exit, Entry, and Long Run Industry Equilibrium I



- Now we must combine **optimizing** *individual* firms with *market-wide* adjustment to **equilibrium**
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  - **Enter** markets where $p > AC(q)$

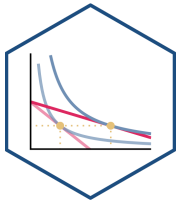
Exit, Entry, and Long Run Industry Equilibrium I

- Now we must combine **optimizing** *individual* firms with *market-wide* adjustment to **equilibrium**
- Since $\pi = [p - AC(q)]q$, in the **long run**, profit-seeking firms will:
  - **Enter** markets where $p > AC(q)$
  - **Exit** markets where $p < AC(q)$

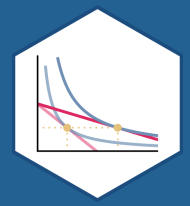
Exit, Entry, and Long Run Industry Equilibrium II

- **Long-run equilibrium**: entry and exit ceases when $p = AC(q)$ for all firms, implying **normal economic profits** of $\pi = 0$

Exit, Entry, and Long Run Industry Equilibrium II

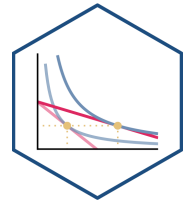


- **Long-run equilibrium**: entry and exit ceases when $p = AC(q)$ for all firms, implying **normal economic profits** of $\pi = 0$
- **Long run economic profits for all firms in a *competitive* industry are 0**
- Firms must earn an *accounting* profit to stay in business



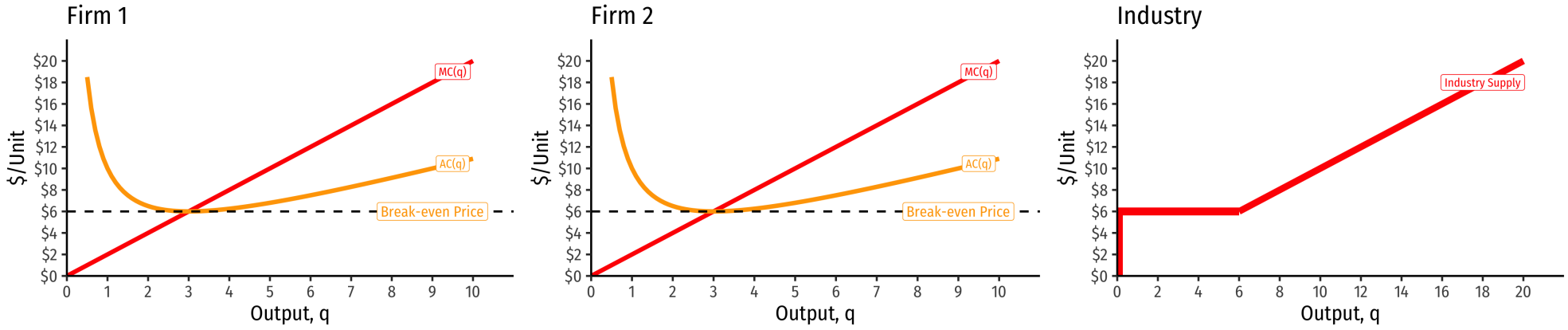
Deriving the Industry Supply Curve

The Industry Supply Curve



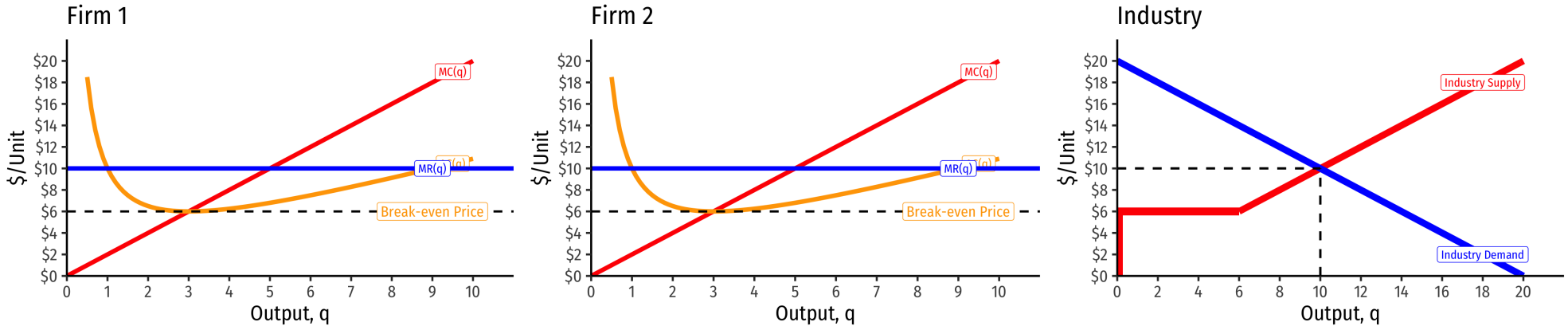
- **Industry supply curve**: horizontal sum of all individual firms' supply curves
  - recall: ($MC(q)$ curve above AVC_{min}) (shut down price)
- To keep it simple on the following slides:
  - assume no fixed costs, so $AC(q) = AVC(q)$
  - then industry supply curve is sum of individual $MC(q)$ curves above $AC(q)_{min}$

Industry Supply Curves (Identical Firms)



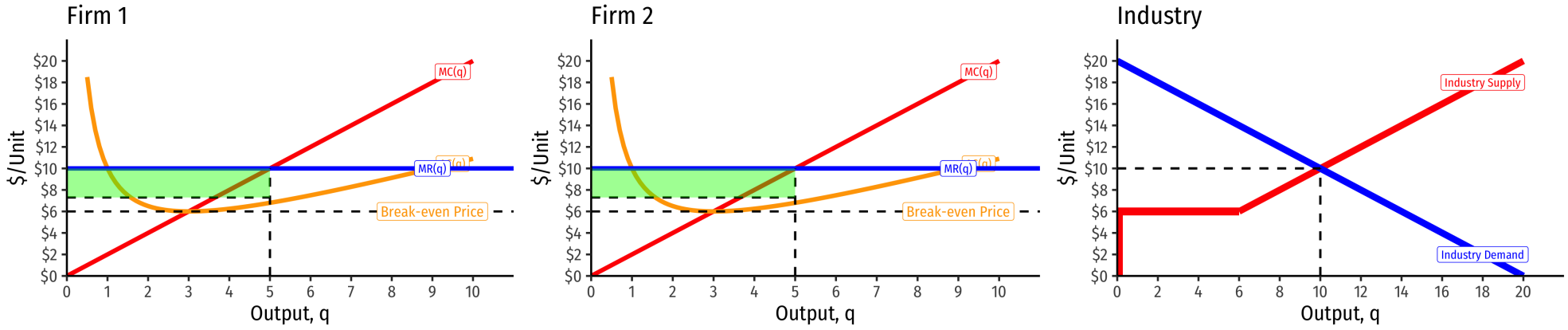
- Industry supply curve is the horizontal sum of all individual firm's supply curves
  - Which are each firm's marginal cost curve above its breakeven price

Industry Supply Curves (Identical Firms)



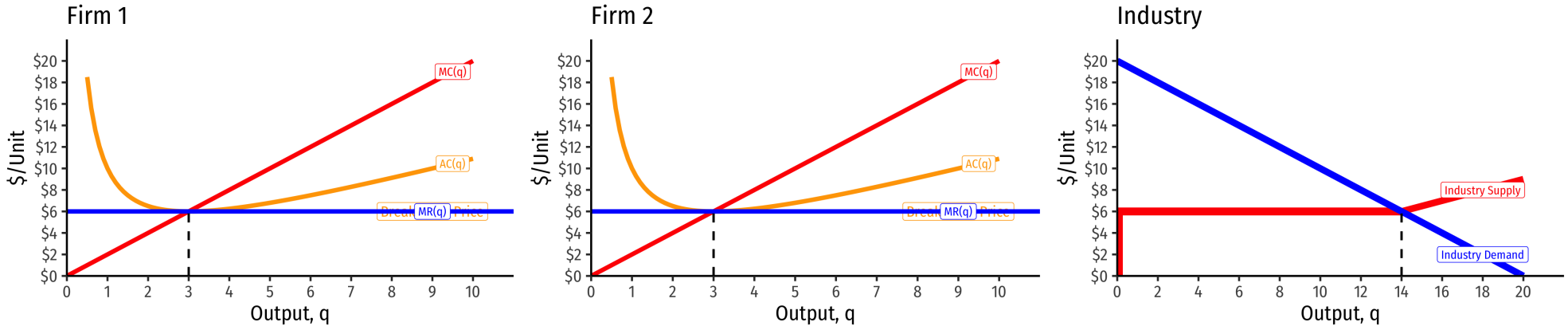
- Industry demand curve (where equal to supply) sets market price, demand for firms

Industry Supply Curves (Identical Firms)

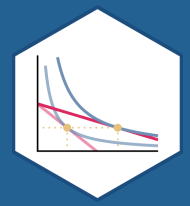


- **Short Run**: each firm is earning **profits** $p > AC(q)$
- **Long run**: induces entry by firm 3, firm 4, $\cdots$, firm n
- **Long run industry equilibrium**:

Industry Supply Curves (Identical Firms)



- **Short Run**: each firm is earning **profits** $p > AC(q)$
- **Long run**: induces entry by firm 3, firm 4, $\cdots$, firm n
- **Long run industry equilibrium**: $p = AC(q)_{min}$, $\pi = 0$ at $p =$ \$6; supply becomes more **elastic**



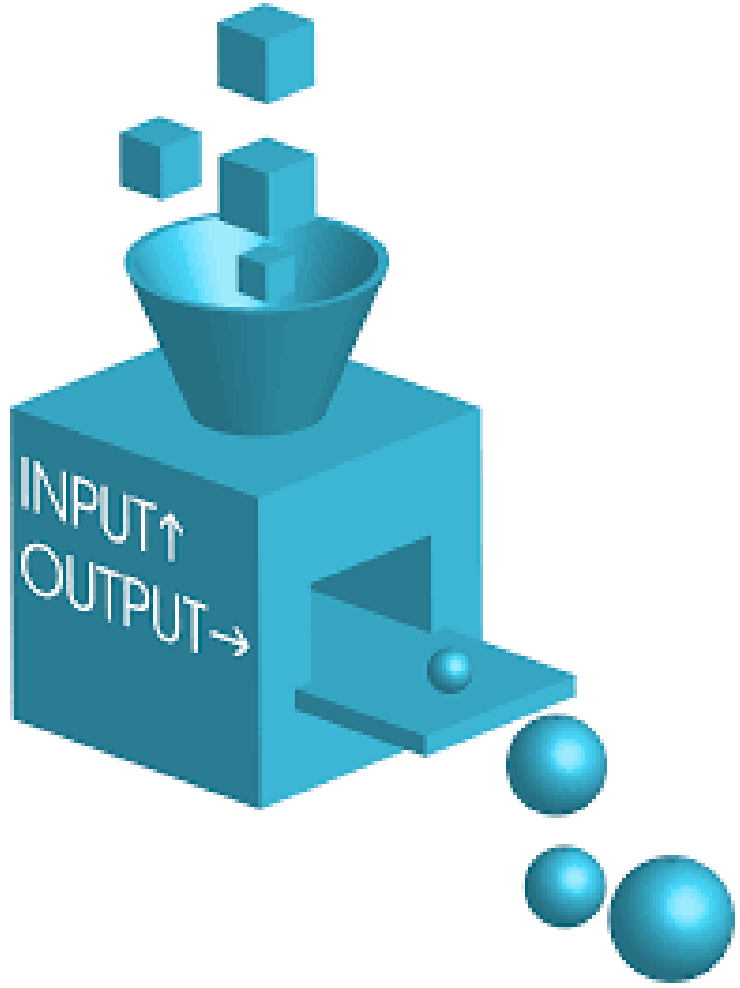
Economic Rents, Profits, & Competition

Back to Zero Economic Profits

- Recall, we've essentially defined a **firm** as a completely **replicable recipe** (**production function**) of resources

$$q = f(L, K)$$

- **"Any idiot"** can enter market, buy required (L, K) at prices (w, r), produce q^* at market price p and earn the market rate of π



Back to Zero Economic Profits

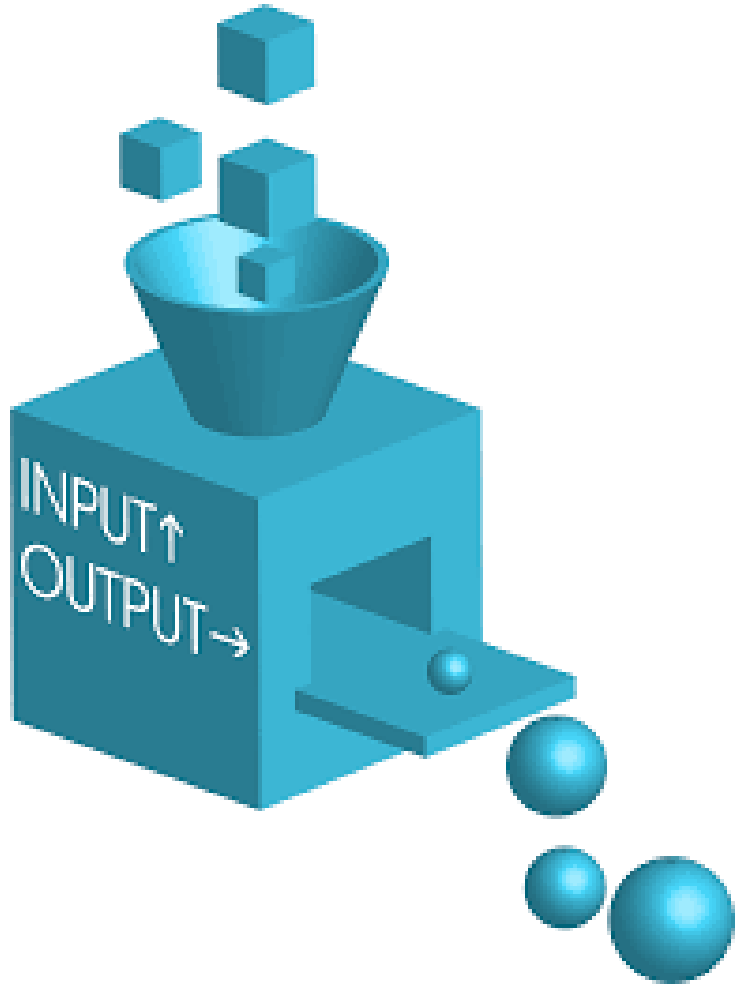
- Zero long run economic profit $\neq$ industry *disappears*, just **stops growing**
- Less attractive to entrepreneurs & start ups to enter than other, more profitable industries
- These are **mature** industries (again, often commodities), the backbone of the economy, just not *sexy*!

Back to Zero Economic Profits

- All factors being paid their market price
  - i.e. their **opportunity cost** — what they could earn *elsewhere* in economy
- Firms earning **normal market rate of return**
  - No *excess* rewards (economic profits) to attract *new* resources into the industry, nor *losses* to bleed resources out of industry

Back to Zero Economic Profits

- But we've so far been imagining a market where every firm is *identical*, just a recipe "any idiot" can copy
- What about if firms have *different* technologies or costs?

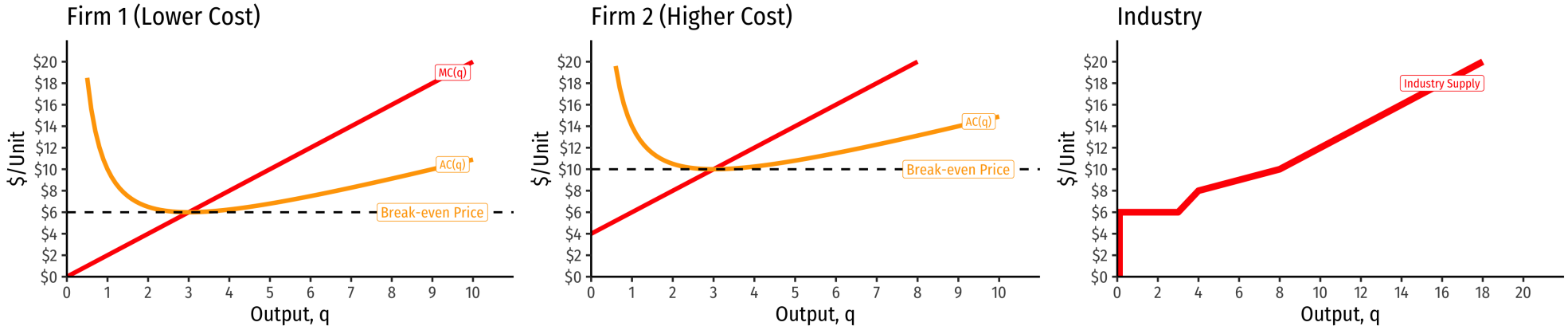


Industry Supply Curves (*Different* Firms) I

- Firms have **<u>different</u> technologies/costs** due to relative differences in:
  - Managerial talent
  - Worker talent
  - Location
  - First-mover advantage
  - Technological secrets/IP
  - License/permit access
  - Political connections
  - Lobbying

- Let's derive **industry supply curve** again, and see how this may affect profits

Industry Supply Curves (*Different* Firms) II



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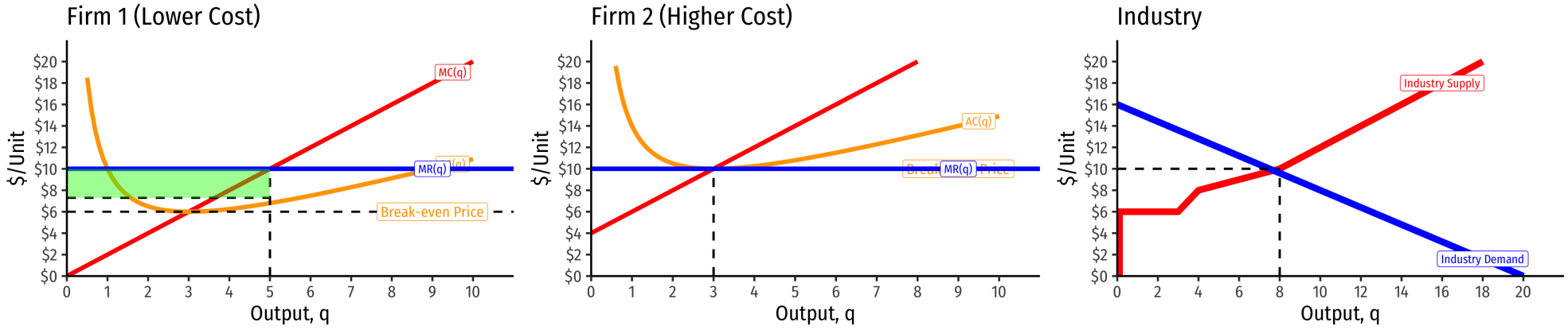


- Industry demand curve (where equal to supply) sets market price, demand for firms
- **Long run industry equilibrium**: $p = AC(q)_{min}, \pi = 0$ for **marginal (highest cost) firm** (Firm 2)
- Firm 1 (lower cost) appears to be earning **profits**...(we'll come back to this)

Economic Rents and Zero Economic Profits I

- **Long-run equilibrium $p = AC(q)_{min}$ of the *marginal (highest-cost)* firm**
- **The marginal firm earns normal economic profit (of zero)**
  - Otherwise, if $p > AC(q)$ for that firm, would induce *more* entry into industry!

Economic Rents and Zero Economic Profits I

- **"Inframarginal" (lower-cost)** firms are using resources that earn **economic rents**
  - returns **higher** than their opportunity cost (what is needed to bring them into *this* industry)
- Economic rents arise from **relative differences** between resources

Economic Rent

- **Economic rent**: a return or payment for a resource above its normal market return (opportunity cost)
- Has no allocative effect on resources, entirely “inframarginal”
- A windfall return that resource owners get for free

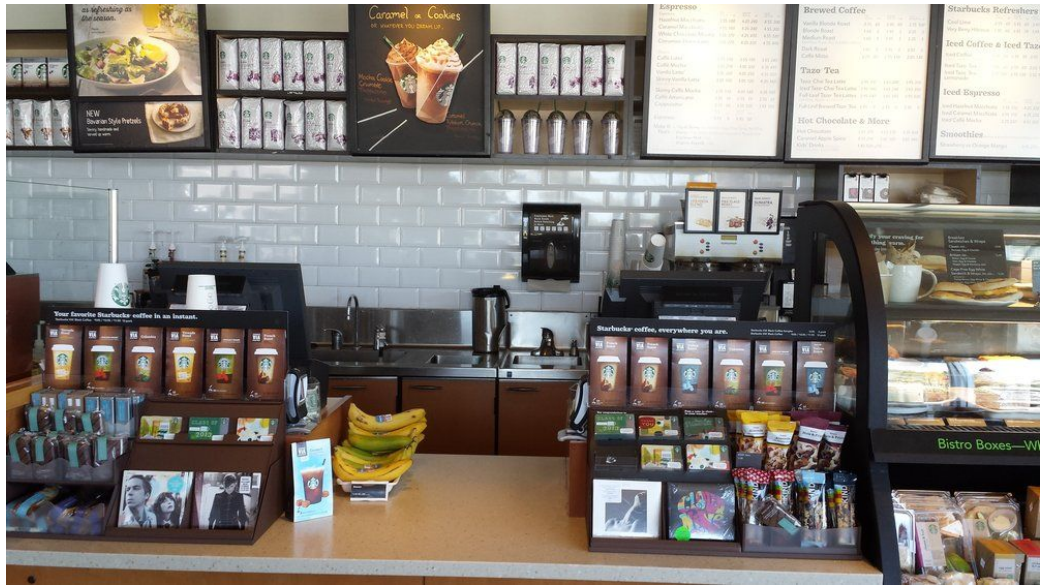
Sources of Economic Rents

- **Some factors are relatively scarce *in the whole economy***
  - (talent, location, secrets, IP, licenses, being first, political favoritism)

Firms Using Resources with Economic Rents

- **Inframarginal** firms that employ these scarce factors gain a **short-run profits** from having lower costs/higher productivity
- ...But what will happen to the prices for their scarce factors over time?

Economic Rents Examples



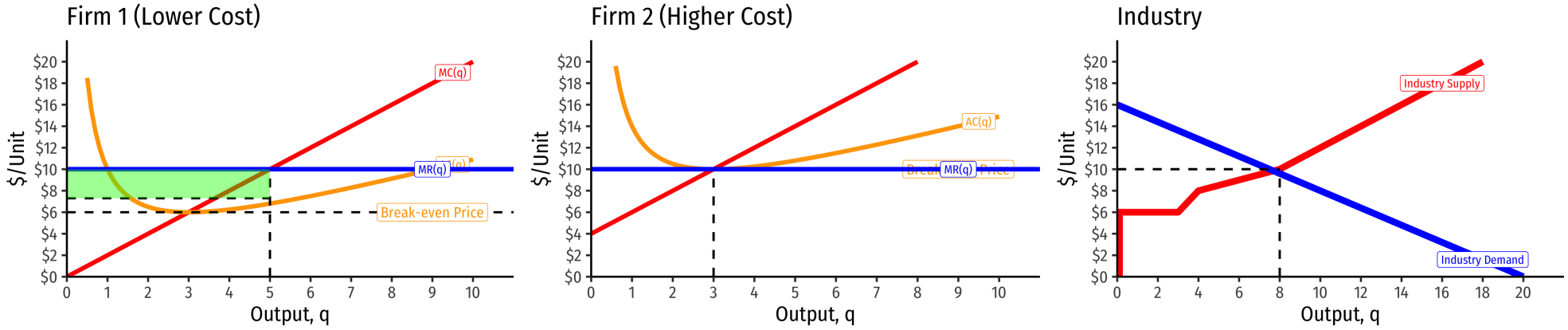
Economic Rents and Zero Economic Profits

- In a competitive market, over the long run, **profits are dissipated through competition**
    - Rival firms willing to pay for the scarce factor to gain an advantage
- Competition over acquiring the scarce factors **pushes up their prices**
    - i.e. higher costs to firms of using the factor!
- **Rents are included in the opportunity cost (price) for inputs over long run**
    - Must pay a factor enough to keep it *out of other uses*

Economic Rents and Zero Economic Profits

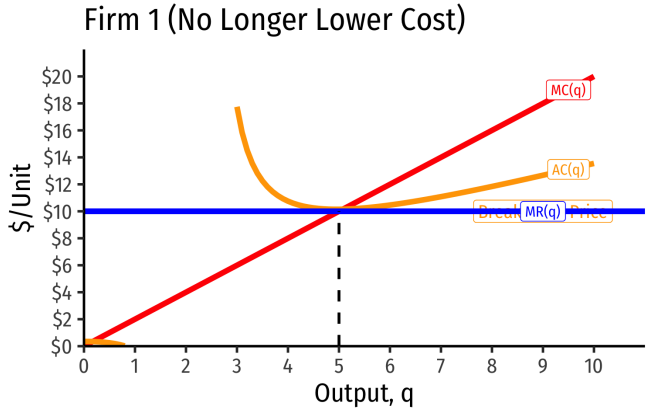
- From the firm's perspective, over the long-run, **rents are included in the price (opportunity cost) of the scarce factor**
    - Must pay a factor enough to keep it out of other uses
- Firm <u>does not earn the rents</u>, they raise firm's costs and squeeze profits to zero!

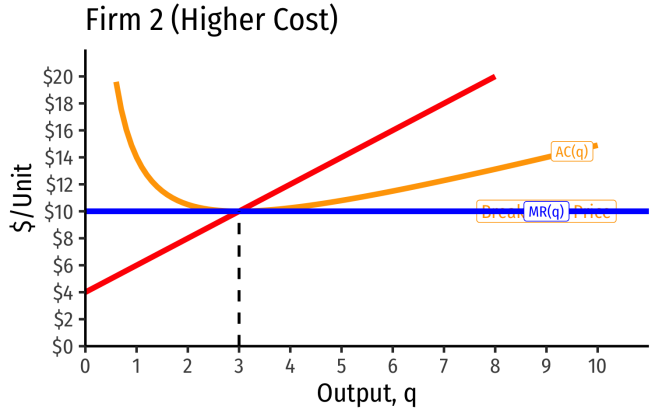
Economic Rents Reduce Profits

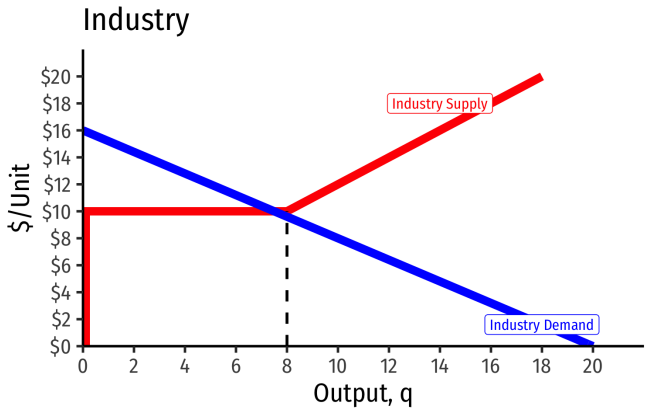


- **Short Run**: firm that possesses scarce rent-generating factors has lower costs, perhaps short-run profits

Economic Rents Reduce Profits







- **Short Run**: firm that possesses scarce rent-generating factors has lower costs, perhaps short-run profits
- **Long run**: competition over those factors pushes up their prices, **raising costs to firm**, until its profits go to zero as well
    - Increase in *fixed* cost (scarce factor), raising AC(q), which now includes rents (more info here)

Economic Rents Go To Resource Owners

- **Owners of scarce factors** (workers, landowners, inventors, etc) **earn the rents as higher income for their services** (wages, rents, interest, royalties, etc).
- Often induces competition to supply alternative factors, which *may* dissipate the rents (to zero)
    - More people invest in becoming talented, try to create new land, etc.

Recall: Accounting vs. Economic Point of View

- Recall **"economic point of view"**:
- Producing *your* product pulls scarce resources *out of other productive uses* in the economy
- **Profits attract resources**: pulled out of other (less valuable) uses
- **Losses repel resources**: pulled away to other (more valuable) uses
- **Zero profits keep resources where they are**
    - Implies **society is using resources optimally**